

## *Titanio caradjae* (Rebel, 1902) comb. n., transferred from Brachodidae (Sesioidea) to Crambidae (Pyraloidea)

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**Summary.** *Brachodes caradjae* (Rebel, 1902) is transferred from Brachodidae (Sesioidea) to *Titanio* Hübner, [1825] (Pyraloidea: Crambidae: Odontiinae). The holotype as well as male and female genitalia are figured. In this context, we give short insights into the systematics of the Odontiinae and provide the hypothesis, that the diagnostic characters ‘structurae squamiformes’ and ‘structurae lamelliformes’ given by Leraut & Luquet (1982) for the Eurrhypini Leraut & Luquet, 1982 can be regarded as synapomorphies of this tribe. Further, we present a possible third synapomorphy for the Eurrhypini, a paired ruffled membrane situated ambilateral to the ‘structurae squamiformes’ of the vinculum.

**Zusammenfassung.** *Brachodes caradjae* (Rebel, 1902) wird von den Brachodidae (Sesioidea) zu *Titanio* Hübner, [1825] (Pyraloidea: Crambidae: Odontiinae) transferiert. Der Holotypus sowie die männlichen und die weiblichen Genitalia werden abgebildet. In diesem Zusammenhang geben wir einen kurzen Einblick in das System der Odontiinae und unterbreiten die Hypothese, daß die von Leraut & Luquet (1982) aufgezeigten diagnostischen Merkmale der Eurrhypini Leraut & Luquet, 1982, die ‘structurae squamiformes’ und die ‘structurae lamelliformes’, als Synapomorphien dieser Tribus gewertet werden können. Desweiteren zeigen wir eine dritte mögliche Synapomorphie für die Eurrhypini, eine paarige, geriffelte Membran beidseitig der structurae squamiformes<sup>7</sup> des Vinculums.

**Résumé.** *Brachodes caradjae* (Rebel, 1902) est transféré de la famille des Brachodidae (Sesioidea) au genre *Titanio* Hübner, [1825] (Pyraloidea: Crambidae: Odontiinae). L’holotype, ainsi que les armures génitales mâle et femelle, sont illustrés. Dans ce contexte, nous effectuons une brève analyse de la systématique des Odontiinae et présentons l’hypothèse que les caractères diagnostiques ‘structurae squamiformes’ et ‘structurae lamelliformes’, énumérés par Leraut & Luquet (1982) pour les Eurrhypini Leraut & Luquet, 1982, peuvent être considérés comme synapomorphies de cette tribu. Nous présentons, de plus, une éventuelle troisième synapomorphie des Eurrhypini, à savoir une membrane en paire, ambilatérale aux ‘structurae squamiformes’ du vinculum.

Key words. *Titanio caradjae*, Pyraloidea, Crambidae, Odontiinae, Sesioidea, Brachodidae, Turkey, reclassification, phylogeny

### Introduction

In 1902, Rebel described *Atychia caradjae* from Kulp, former Armenia, in the family Tineidae. Heppner (1979) showed that the generic name *Atychia* Latreille, 1809, the type genus of Atychiidae, is a junior homonym of *Atychia* Ochsenheimer, 1808, now known to be a junior synonym of *Adscita* Retzius, 1783 (Zygaenidae). Therefore, Heppner (1979) proposed for Atychiidae the new family name Brachodidae with the type genus *Brachodes* Guenée, 1845. Subsequently, Heppner (1981) combined *Atychia caradjae* Rebel, 1902 with *Brachodes* Guenée, 1845.

An examination of the holotype of *Atychia caradjae* Rebel, 1902 revealed that this species does not belong either to the Brachodidae or to any other family of Sesioidea. The presence of an abdominal tympanal organ of the pyraloid type with a praecinctorium and the cranially open bullae tympani indicates that this species belongs to the family Crambidae within Pyraloidea (cf. Minet 1982; Maes 1985). Within Crambidae, *caradjae* appears to be part of the subfamily Odontiinae according to the conspicuously projected

frons, the absence of chaetosemata, the valvae of the male genitalia which are radially fluted (cf. Munroe 1961, 1972), and the gnathos arms which are basally fused with the tegumen.

We here transfer *Atychia caradjae* Rebel, 1902 to the genus *Titanio* Hübner, [1825] within Odontiinae, discuss this generic placement and provide a redescription of the species. In this context, we outline some phylogenetic aspects of the two odontiine tribes Odontiini Guenée, 1854 and Eurrhypini Leraut & Luquet, 1982.

## Methods

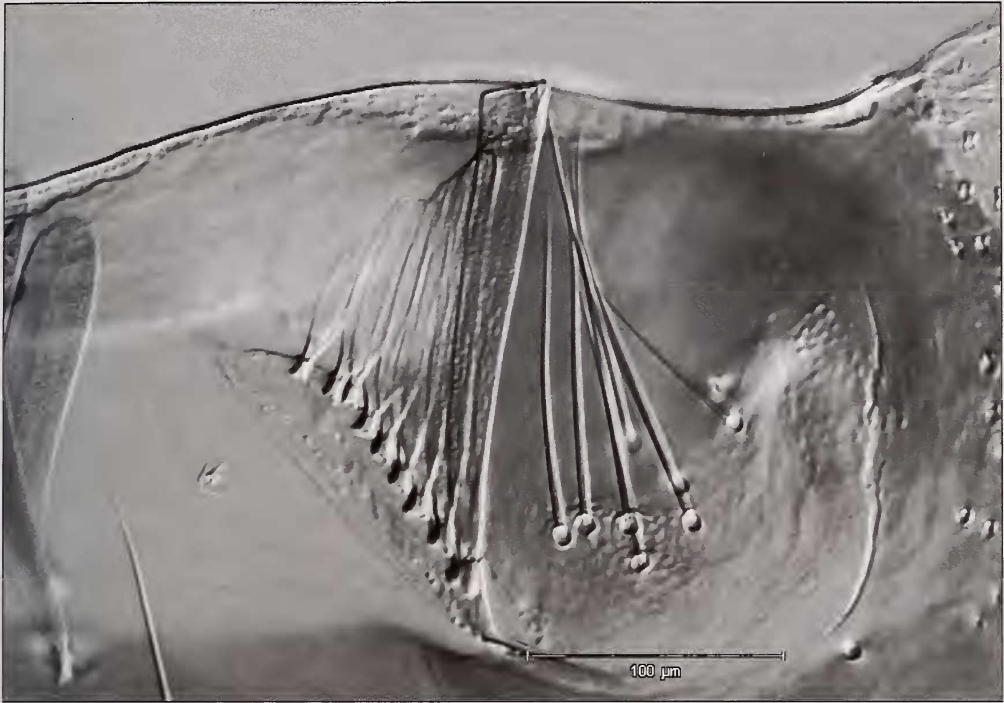
The preparation of genitalia followed Robinson (1976) and Nuss (1999). Genitalia were investigated using the microscope Nikon Eclipse 600. Images of the genitalia have been taken with the photomicrographic equipment Nikon H-III, details (Figs. 1–2) taken using interference contrast and three dimensional computer microscopy with extended focus option (digitaloptics, Jena).

## Systematics of Odontiinae Guenée, 1854

Within Odontiinae, there are 367 species described worldwide (Heppner 1991) placed in more than 100 genera (Fletcher & Nye 1984; Nuss, unpubl.). Munroe (1961, 1972,



**Fig. 1.** *Eurrhypis pollinalis* ([Denis & Schiffermüller], 1775). Caudal view on the left side of central part of male genitalia showing two synapomorphies of Eurrhypini, the 'structurae squamiformes' (S) arising in the middle of the vinculum (V) and the 'ruffled membrane, laterally of this structure (indicated by the arrow); both characters are situated caudally to the juxta (J). (GU Nuss 933-00; extended focus-option: 61 planes with an interplanal distance of 2  $\mu\text{m}$ , object depth 123  $\mu\text{m}$ ).



**Fig. 2.** *Eurrhypis pollinalis* ([Denis & Schiffermüller], 1775). Dorsal view on the VIII sternite showing synapomorphy of Eurrhypini, the 'structurae lamelliformes' (GU Nuss 933-00; extended focus-option: 29 planes with an interplanal distance of 1 μm, object depth 27 μm).

1973), who revised the North American Odontiinae, established a system in which the shape of the frontal projection plays a major role. Although the frontal projection is a useful diagnostic character, we do not share this typological concept which results in so many monotypic genera.

Leraut & Luquet (1982) established two tribes within Odontiinae, the Odontiini Guenée, 1854 and the Eurrhypini Leraut & Luquet, 1982. The latter are supposedly monophyletic by two possible synapomorphies in the male genitalia, the 'structurae squamiformes' (Fig. 1) and the 'structurae lamelliformes' (Fig. 2). The 'structurae squamiformes' are scales arising in the middle of the vinculum and the 'structurae lamelliformes' are an assemblage of sensillae chaeticae and spatulate scales on the VIII sternite (cf. Leraut & Luquet 1982: fig. 16). Additionally, there is a paired membrane situated ambilateral to the 'structurae squamiformes'. Each of these membranes is cut 17 times by very fine transversal cracks (Fig. 1). In *Eurrhypis pollinalis* ([Denis & Schiffermüller], 1775), the distance between two neighbouring cracks is 12 μm (Fig. 1) (♂ Germany, Dresden-Lößnitz, 29.v.1916, Möbius leg., coll. Museum für Tierkunde Dresden, GU Nuss 933). We consider this structure as a third synapomorphy of the Eurrhypini. Beside the Palearctic genera *Emprepes* Lederer, 1863 and *Eurrhypis* Hübner, [1825], these characters were also found in the Nearctic genera *Jativa* Munroe,



1961, *Mimoschinia* Warren, 1892, and *Pseudoschinia* Munroe, 1961 which therefore are also associated with the Eurrhypini here.

The Odontiini remain probably paraphyletic since no synapomorphic character is recognised for this group so far. Odontiine taxa belonging to this tribe are therefore recognised by the absence of the three synapomorphies listed above for Eurrhypini. Both, the type-species of *Titanio*, *T. normalis* (Hübner, 1796) (♂ South Ukraine, Nowo-Aleksejewka, 7.vii.1943, M. Sälzl jr. leg., Zoologische Staatssammlung, Munich) as well as *caradjae* Rebel, 1902, lack these synapomorphies and therefore belong to the tribe Odontiini.

Furthermore, *T. normalis* and *caradjae* present a similar shape of the frontal projection of the head and show a good correspondence of genitalia morphology. Although we cannot find any generic definition which completely fits the morphology of *caradjae*, we provisionally transfer *Atychia caradjae* Rebel, 1902 to *Titanio* Hübner, [1825] to prevent the establishment of a further odontiine genus before this subfamily has been revised.

***Titanio caradjae* (Rebel, 1902) comb. n.**

(Figs. 3–5)

*Atychia caradjae* Rebel, 1902: 122–123, pl. 4 fig. 11a–b.

Material examined. Holotype (by monotypy) ♀ (Fig. 3) “Kulp | Sud Kars | (Armenien) | VI. 1901”, “*Atychia* | *caradjae* Rbl | ♂ [sic]. Type”, “Holotype | *Atychia* ♂ [sic] | *caradjae* | Rbl. | ROMANIA”, “GU 781 | prep. Nuss 1997”, Muzeul de Istorie Naturala “Grigore Antipa”, Bucuresti. ♂: Syria sept., Taurus, Marasch, 20. v. 1928, leg. L. Osthelder, GU Kallies 156-96, Zoologische Staatssammlung, Munich.

**Head.** – Frons with a rounded, sharply edged prominence; ocelli present; chaetosemata absent; labial palpi short, porrect; maxillary palpi absent (reduction!); conspicuous pilifer; proboscis basally scaled; upper side of antenna scaled, underside setose; occiput with a collar consisting of white, elongated upright scales; head and palpi ventrally white scaled; upper side of head, thorax and abdomen black with a leaden shine.

**Wings** (Fig. 3). – Forewing length 3 mm (male), 4.5 mm (female); forewings scaled vermilion light; basal area, median line, and tip of termen shining lead-coloured; fringe basally greyish brown, distally light brown, at apex whitish; hindwings proximally greyish-brown, remaining part vermilion light, fringe greyish brown. Underside paler, without lines, basally greyish-brown; forewings in the middle and at the costa vermilion light, at dorsum and at termen whitish, fringe as on upper side; hindwings uniform vermilion light.

**Male genitalia** (Fig. 4). – Uncus distally bilobed, setose; base of gnathos fused along entire ventral edge of tegumen, distally thick and pointed, slightly dentate; juxta large trapezoid, distally double pointed and dentate, dorso-basally joining a long and slender structure, which is distally bilobed and dentate; vinculum broad U-shaped but thin, saccus enlarged; valvae simple, dorso-basally strongly sclerotised, distally conspicuously broadly ovate, as typical for Odontiinae; aedeagus straight, with three long cornuti.

**Female genitalia** (Fig. 5). – Corpus bursae membranous, ovoid; ductus bursae short, membranous, posterior part strongly sclerotised; ostium with sclerotised surrounding; ductus seminalis arises from sclerotised part of ductus bursae; VIIIth segment with a ring of hairs; ovipositor short; papillae anales short, thick, strongly bilobed, setose.

**Diagnosis.** – Among Palaearctic Odontiinae, this species is unique in possessing vermilion coloured wings with basal area, median line, and tip of termen in forewings shining lead-coloured. With *T. normalis*, it has in common the enlarged juxta with the bimodal, dentate tip. Further taxonomic studies are necessary to show the phylogenetic relationships of *T. caradjae*.



Fig. 3. *Titanio caradjae* (Rebel, 1902) **comb. n.**, holotype ♀.



Fig. 4. *Titanio caradjae* (Rebel, 1902) **comb. n.**, ♂ genitalia (GU Kallies 156-96).



**Fig. 5.** *Titanio caradjae* (Rebel, 1902) **comb. n.**, ♀ genitalia (GU Nuss 781-97).

**Distribution.** – Only known from the type locality Kulp (= Tuzluca, Prov. Igdir, Turkey) and the eastern Toros mts. (Prov. Kahramanmaras, Turkey).

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